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ABSTRACT

This report summarizes the findings of the EISO project, which was funded in 1975 to develop, evaluate, and analyze an information dissemination system based upon computerized retrieval of bibliographies. With much of the research component completed, the service component is operational, providing Ontario educators with online bibliographic references in education and the social sciences and with access to original documents. Findings of the report are reviewed in four areas: (1) It identifies EISO users over the past three years, presents their reasons for seeking information, provides analyses of how information they received impacted upon their local situations, and identifies factors that contributed to the use or non-use of information received. (2) It describes factors affecting interview effectiveness in online bibliographic retrieval, outlines a 5-stage pattern or structure in negotiation, discusses the use of open and closed questions and the part role and status play in interview relationships, and develops a preliminary model of the negotiation process. (3) It discusses a systems evaluation model of user satisfaction with EISO. (4) And it reviews the current status of EISO--the result of research, development, dissemination, and evaluation. (JD)

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THE EDUCATIONAL INFORMATION SYSTEM FOR ONTARIO
SUMMARY OF FINAL REPORT

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The Ontario Institute for Studies in Education

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

THIS RESEARCH PROJECT FUNDED UNDER CONTRACT
BY THE MINISTRY OF EDUCATION, ONTARIO
Toronto 1978

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THE EDUCATIONAL INFORMATION SYSTEM FOR ONTARIO: SUMMARY OF FINAL REPORT

This paper summarizes the final report of the Educational Information System for Ontario, a research contract funded in March 1975 by the Ministry of Education of the Province of Ontario. Though much of the research component of the project is now completed the service aspect of EISO continues to provide Ontario educators with online bibliographic retrieval of references in education and the social sciences and with access to original documents.

Background

EISO was funded to develop, evaluate, and analyze an information dissemination system based upon computerized retrieval of bibliographies. It differed from the usual research contract in that it was not only to provide a rigorous research study firmly grounded in theoretical concepts, but it was also to have a largely developmental component in the implementation of a search service available to educators on a fee-paying basis. Thus, not only were normal aspects of contract research such as research design, data collection and analysis required, but also some more unusual activities. Among these were the creation of a business system, publicity materials, promotional workshops, and a program to train Educational Information Consultants who were to act as information intermediaries or linkage agents in geographically remote areas. Professional development activities, seminars, and demonstrations added still other aspects to the study. The aspect of the contract that was most readily apparent to educators and the one that still continues was, however, the actual creation of a fully operational information service offering an interactive online bibliographic search service to the educators of Ontario by providing them access to existing data bases such as the Ontario Educational Research Information System (ONTERIS), ERIC, *Psychological Abstracts*, *Exceptional Child Education Abstracts*, *Social Sciences Citation Index*, *Dissertation Abstracts International* and other data bases relevant to educators.

To use the EISO search service, the educator submits his information request to the search analyst, a specially trained reference

librarian, who develops a search strategy that is machine-readable. Bibliographies are printed offline by a major commercial supplier like Lockheed or System Development Corporation and mailed to the user who may then order original documents in either microfiche or paper copy formats. A fee based on the amount of professional and computer-connect time used is charged for the search and a flat rate for duplicates of original items.

Research conducted as part of the EISO contract focussed on the user, and his or her interaction with the service. Answers were sought to the following questions: Who uses EISO, and why? How satisfied are they with the service? What is the nature of the interaction between the client and the search analyst during question negotiation? And, What are the inter-relationships between these various aspects of the search service? Our answers to these questions and the influence of these answers on the current organization and operations of EISO are the topics of this paper.

The User and the Uses of EISO Information

The growing importance of the provision of information by automated means has been reflected in the increasing number of articles and studies devoted to online reference services. The focus of much of this work centres around developing accurate costing techniques and describing and evaluating specific services. The users of these services have received little attention. Generally, however, concern for the user and the way in which he uses the information he receives has been of greater concern to educational researchers and sociologists than information specialists. This concentration is understandable. Information managers, librarians, and search analysts can rarely influence the use of the information they provide to the user: local exigencies, administrator commitment, financial constraints, the political climate may all impinge on the ultimate use of retrieval information. Ironically, however, it is the effective use and impact of the search results that may determine whether or not a user perceives the service to be useful and becomes a satisfied client who returns to the search service to place further requests. And it is upon the building up of such a repeat-user clientele that the survival of a search service may depend.

The purposes of this section, therefore, are to identify EISO users over the past three years, present their reasons for seeking information, provide analysis of how the information they received impacted upon their local situations, and identify factors that contributed to the use of non-use of information received.

User Characteristics

Location. About half of EISO's most recent users come from the Metropolitan Toronto area, providing the mainstay of the service. This high figure has remained fairly stable throughout the project's three years, a fact that is all the most interesting because some professional libraries in local school boards have recently purchased their own terminals and are now offering their own search services. This leads one to suspect that the actual number of users from the greater Toronto area may be going up but that this increase is being partially obscured and absorbed by other available services.

The number of users from the Ottawa area has increased from 1.9% to 7.8%, perhaps reflecting the fact that several workshops and seminars were given to governmental officials and at summer courses held there thus raising awareness of the service and acting as a stimulant for usage.

A rise of the number of users from provinces other than Ontario (.8% to 3.9%) may reflect EISO's new policy of processing all requests received regardless of their geographical origin.

Personal Characteristics. The age, sex, education, and professional activities of EISO users have remained stable over the three years the service has been in operation. Two-thirds of the users continue to be male, and over three-quarters of all users are between 26 and 45 years of age. Most users have occupied their present position for less than two years. Over one-half are officers of a professional organization, have participated in an educational research project in the past five years, and have presented a professional paper during that time. Sixty-nine percent have earned graduate degrees while 57% are currently enrolled in, or are planning to apply for, academic programs leading to a higher degree.

Clearly, EISO users are a highly professional, dynamic, well-educated, and ambitious group.

Organization. While OISE is still the institution with which most users are affiliated, it provides only a little over one-third of the total number of users (36.6%), a decline from 39.5% the previous year. Faculties of education, Ministry of Education, and other government agencies continue to provide increasingly more users while the number of school board clientele remain steady.

Role. The roles performed by EISO users remained for the most part unchanged. Administration and teaching are still the most important roles occupied by EISO users. These are followed by graduate work and research. These profiles of user roles have shown little variation over a three-year period and will probably continue to remain stable.

The distribution of users by their roles in various organizations is as follows. In public boards, users were most likely to be administrators or supervisors (57%) though other staff also used EISO services to a significant degree with teachers, researchers, and librarians comprising another 35% of board users. All users from the separate boards fell within the administrative ranks while users in post-secondary institutions were distributed among administrators (33%), teachers (53%), and students (7%). Most OISE users were students (43%) though other staff categories were also represented. Regional Office personnel were the largest (60%) user group at the Ministry of Education.

It would appear that the patterns that were established in the first two years of the service continue to hold. EISO is used as a resource primarily by administrative personnel in school boards, by faculty in post-secondary institutions, by doctoral students at OISE, and by administrative and Regional Office staff at the Ministry of Education.

Purpose of Searches

Among all users, the most frequently cited purpose for doing a search was for term papers. Research and development, speeches or articles,personnel or recruitment and program development were also listed as the purposes for placing EISO searches. Users tended to approach EISO as a resource to support their primary professional role.

For example, within school boards administration was the most frequently mentioned role for doing a search. These administrative personnel performed searches to aid them with their responsibilities for program improvement (23%), personnel recruitment (17%), policy development (13%) and curriculum development (13%). Though it would appear that a few administrators did place searches to help with their graduate studies, most sought information for purposes consistent with their professional positions.

This quantitative data gives a general overview of the user population and their reasons for requesting searches. To provide a more rounded picture of the human motivation that prompts specific searches and the factors that contribute toward the successful use of the information we must turn to descriptive or qualative data. Such data is of course difficult to document and assess. Often influences beyond the control of the individual are overriding factors in whether or not information is used for the purposes for which it was originally sought. Another limiting factor is that evidence of usage has been compiled through interviews that relied on self-reporting. Though onsite observation may have provided more reliable evidence, seven case studies were carried out for the insight they might provide into some of the elements that determine use or non-use of search results. In each case, in-depth interviews were used to collect information.

Factors Contributing to Use of Non-Use of Search Results

The seven mini-cases are described in the full report, and though they represent an admittedly limited sample of users, nevertheless point to some factors that either encourage or pose barriers to the use of information received as a result of placing an EISO search. These factors may be evident during both the pre-search and post-search and are described in Table 1.

It is interesting to note that whereas in the cases of successful information use each user was spurred on by the need to report to or work with staff or committees, the non-users were all loners. It might be expected, therefore, that they would have to display greater independence, self-reliance, and personal motivation than the successful users and would not have the rewards of immediate positive feedback. In the cases

TABLE 1

FACTORS AFFECTING INFORMATION USAGE

	User	Search Phase			
		Pre-Search Phase		Post-Search Phase	
		Pros	Cons	Pros	Cons
POSITIVE	Psychologist	1. Active researcher 2. Chairman of committee with information need 3. Authority to implement	1. No "classics" 2. Newness of "play therapy"	1. Articles to committee members 2. Committee responsible for implementation	1. Difficulty in obtaining articles
	Junior High School Principal	1. Postgraduate student 2. Dissatisfaction with existing programs 3. Authority of position	1. Telephoned request	1. Support of principal 2. Literature reviewed by teachers	1. Too much material 2. Too little time 3. Inadequacy of telephone interview
	Program Coordinator	1. Committee-initiated search 2. Well-defined problem 3. Authority		1. Articles to committee members 2. Each member gave talk 3. Author invited as guest speaker 4. Information supported position 5. New information provided 6. Speed	
	Superintendent	1. Opinion leader 2. Information needed for workshops		1. Information made into packages 2. Workshops given to department heads	
NEGATIVE	Ph.D. Student	1. Postgraduate student	1. Undefined information problem 2. Inability to communicate		1. Irrelevant material 2. Different topic
	M.Ed. Student	1. Postgraduate student	1. No information need 2. Limited course requirements 3. Job pressures		1. Format of bibliography 2. Quantity of information 3. Lack of urgency 4. Effort required to obtain documents
	Primary Teacher		1. Unable to explain topic		1. Irrelevant material

dealt with here, this increased burden of responsibility without positive external support created a barrier to use that was not overcome.

User Satisfaction with EISO

One of the most important and most difficult aspects of an online search service to evaluate is the satisfaction of the user. User satisfaction is significant because it will affect the ultimate success of the service: a satisfied user is more likely to become a repeat user and an advocate of the system that has met his needs. And it is the build-up of a steady clientele and the spread of its success by word of mouth that will help to ensure its long-term operation. Measuring user satisfaction, however, is fraught with difficulties for we are trying to assess what is, after all, a state of mind. Not only is it highly subjective, but it is in all likelihood subject to frequent shifts and changes.

Recognizing this complexity the Educational Information System for Ontario developed an evaluation scheme based on a systems model using psychological, sociological, and economic variables within an adoption of innovations framework.

Yearly Satisfaction Averages

A comparison of the average satisfaction of EISO users over the three years of the service's operation shows a remarkable consistency. Changes in average level of satisfaction ranged from an increase of .20 for Timeliness of Service to a decrease of .04 for Quality of Technology. There was virtually no significant variation in perceived satisfaction among EISO users over the three-year period with the average user being highly satisfied with the service he received. This high average satisfaction was expressed by means of 2.61 and 2.79 for Overall Satisfaction and Quality of Service, respectively, on a three-point scale. Fewer than 5% of users were not satisfied with the outputs of the service, the Value of the Bibliography and Materials, during the most recent year of operation. This represents a significant improvement from the more than 17% who expressed reservations the previous year or the almost 30% in the first year. Clearly, EISO continues to improve, with over 95% of users being satisfied with the service provided.

Monthly Satisfaction Averages

While it is true that, on the whole, the SIRS service is maintaining high standards, fluctuations do occur from month to month depending on the time of year, major changes in system operations, and the size of the sample for which responses were received. It is as well to recognize that these variations do occur and in fact appear to be a normal part of the service environment so that undue anxiety or unrealized further action or policy are avoided.

Among the most important measures assessing the satisfaction of users with SIRS are those evaluating their perception about the quality of Service and the Value of Bibliography and Materials. Because of the importance of these aspects, mean satisfaction levels of users reporting them were plotted on a monthly basis from July 1975 through October 1977. An average Overall Satisfaction level was also obtained.

It was found that Overall Satisfaction was remarkably steady, ranging between 2.6 and 2.7 on the three-point scale employed. The monthly average remained within ±0.1 units of 2.6. A noticeable drop did occur, however, during the Spring of 1976 but this was attributed to the hiring and "breaking in" period of a new search analyst. It was also noted that Overall Satisfaction tended to decline during those periods when demands for searches reached peak levels of 55 or more per month.

An analysis of trends since the employment of the second search analyst reveals two interesting features. First, the previously observed decline in satisfaction levels with the Value of Bibliography and Materials during hectic periods seems to be continuing, though with less frequency. It should be noted, however, that this "decline" in satisfaction is a relative thing. That is, the satisfaction level for this item never fell below 2.0 between October 1976 and October 1977. This means that even at its worst, the service was never seen to be below a satisfactorily high level of performance.

Second, the Quality of Service has on four separate occasions (September 1976, November 1976, April 1977, August 1977) been assessed at 3.0, the highest level obtainable on a scale of three points. During that same October 1976 to October 1977 period Quality of Service never fell below 2.7 and hovered at the 2.8 level.

Because the human element of relating and using information was, from the very beginning of this research project, regarded as critical, it was felt that some special provision had to be made for users who were located at a distance from Metropolitan Toronto and thus did not have immediate access to the service. The basic assumption was that the provision of an intermediary, called an Educational Information Consultant, or EIC, familiar with local conditions and needs, would lead to a more satisfied user and more effective communication and utilization of knowledge. In turn, a satisfied user, according to adopters of innovation models, could be expected to become a regular user who would have the desired effect of ensuring the maintenance and growth of the information service.

To test whether or not such assumptions could be proved empirically, special attention was given to the Northeastern Region of Ontario. There, the EICs in different types of institutions were trained, demonstrations of the service were held, and refresher visits were maintained for the first year of the service's operation.

The first goal the EICs were asked to achieve in their initial training was to make users aware of their availability and the services they could provide. Therefore, one would expect the EIC users to be relatively more satisfied with their information about the service than non-EIC users who were not exposed to such personal efforts. There is evidence to support that this was in fact the case. In particular, there is a slight tendency for EIC users to be more satisfied with specific aspects of the automated bibliographic retrieval service than non-EIC users. These areas of greater user satisfaction tend to be publicity about and directions for using the service and the quality of the technology. EIC users are less satisfied than their non-EIC counterparts with those aspects of the service that call another step in the ordering process and therefore stress their receipt of the information. This suggests that the EICs role might be more useful in the preliminary stages of raising awareness and providing incentives for using the service. It would appear that the intermediate steps of search optimization might be left to the search analyst and the ordering of materials to the user. In that way, service can be made of the best availability of the

EIC, the technical expertise of the analyst, and the enthusiastic need of the user for a more speedy delivery time.

The Negotiation Process In Oneline Bibliographic Retrieval

One of the most important aspects of online search services is the negotiation process that takes place between the librarian or search analyst and the user seeking information. For it is during that encounter that the user must make his needs known, the search analyst must comprehend the request, and translate it into the terminology and configuration that will result in the successful retrieval of appropriate citations. Yet little has been written that attempts to analyze what happens during the negotiation process. A review of the literature was carried out to identify the major elements of that process as outlined in the literature. These theoretical components were applied to actual negotiation interviews to ascertain their applicability thereto, and to develop a model that describes the component elements of the negotiation process. The development of such a model is seen as having implications for the training and performance of search analysts and therefore contributing to the improvement of automated search services.

Factors Affecting Interview Effectiveness

Empathy. It is recognized that the absence of videotapes imposes some limitations on the ability to fully capture the nuances of facial expression, the position of the hands and body of the search analyst, and to identify all exhibited aspects of nonverbal behaviour which the search analyst makes use of to promote empathy with the user. The use of tape-recordings do, however, make it possible to identify one category of empathetic behaviour, the use of verbal and nonverbal expressions said in a warm, accepting and understanding manner.

Examples are interviewer statements such as" "Uh-hmm," repetition of the user's last statement, "You feel that (last statement said)," and confirming statements such as "Yes, that seems to make sense." Other forms of empathic behaviour include humour, and statements such as "Okay," "Uh-huh," "Really," and "Oh, I see." One implication is that this form of

behaviour encourages the user to relax and talk freely, rather than withdraw into uncomfortable monotonic responses. Encouraging the user to talk solicits information about his topic of interest which is crucial to the understanding of his problem. Only if this first step is completed successfully, can the search analyst move on to the next stage of attempting to interpret the problem in terms of descriptors on the system.

In practice, we found most of the search analyst's empathic comments relative to the total of such comments uttered during the entire interview occurred during the opening minutes of the interview when it is vital that the user be at ease and talk about his topic of interest as fully as possible. This undoubtedly will also influence user satisfaction with the service generally, and his decision as to whether he will use the service again and/or favourably recommend it to his colleagues and friends.

The Structure of Negotiation. The underlying five-stage pattern or structure that is suggested by the literature for interviews was confirmed.

Stage One

The first stage revolves around the analyst's attempt to clearly understand the user's request. This seems to be a most critical stage, for only after its successful completion can the search analyst move to the second stage. The length of the first stage depends on how clearly the user has identified and defined his topic in his own mind, the complexity or uniqueness of the topic itself and how articulate the users are in explaining their need to the analyst. The degree of user articulation in this study tends to be quite high, since users are generally either master's or doctoral students, professors, government administrators, or members of school boards. In this stage also, users may be given a general outline or description (or may even ask for such) of how the system works. This tends to provide some preliminary even if limited understanding of the relationship between the terms (descriptors) and how access to the system is obtained, and seems a valuable prelude in later helping to identify descriptors and key phrases.

Stage Two

The second stage involves an effort to identify the major areas of the user's topic of interest and to match these with major descriptors or phrases which will provide access to the data base(s). With the first stage over, the second proceeds fairly rapidly. Since all the users are educators of one sort or another, the terminology used tends to be limited, allowing the search analyst to build up familiarity with the language of the discipline. In most instances, relevant tools such as the *Thesaurus of ERIC Descriptors* located on the analyst's desk is consulted by the user and analyst during their interview.

Stage Three

Next comes the identification of terms related to the major descriptors. In this stage an attempt is usually made to broaden and extend as much as possible the topic first presented by the user. In this stage a list of very specific words (descriptors) is identified. This process may be a fairly lengthy one and with the possible exception of the first stage, may take the most time during the interview.

Stage Four

During stage four, the search analyst outlines the main and alternate strategies she will use in the search, and ranks and/or combines the related terms with the major descriptors/headings. This stage usually acts as a further clarification of the topic and the aspects of it that are most important, and the user is asked to further extend, change, or modify the terms as necessary.

Stage Five

The closing stage is usually devoted to "housekeeping information" when the user's address and billing instructions are obtained and he is told how much material to expect, when, and how much it is likely to cost.

It should be noted that while Stage One usually occurs at the beginning of the interview situation, the remaining stages do not necessarily follow sequentially in the order presented above. For example, an indication of what the user can expect in terms of the volume of material,

may occur immediately after the first stage or the search analyst may proceed to identify related terms during the first stage in an attempt to understand the topic more clearly (especially if it is a complex or unique one) before making an attempt to specify and list major headings. In spite of variations, however, the basic underlying pattern above tends to persist.

Open and Closed Questions. The distribution of "open" and "closed" questions asked by the search analyst in the four interviews appears below:

TABLE 2

OPEN AND CLOSED QUESTIONS ASKED IN INTERVIEWS WITH USERS A, B, C, AND D

User	Open Questions	Closed Questions	Length of Interview
A	13	43	40 minutes
B	7	9	9 minutes
C	9	27	33 minutes
D	4	18	21 minutes

The frequent use of the open question encourages the user to talk and therefore allows him to shape his request. It would be expected, therefore, that more "open" questions would occur in the opening minutes of each interview when the user must explain his request. There seems to be good support for this contention in the four interviews being considered here. In the interview with User C more than one-half of the open questions (five out of nine) were asked in the first four minutes of the interview; in User D's interview, one-half of the total of such questions (two out of four) occurred in the first seven minutes; and almost one-half of those found in the interview with User B (three out

of seven) occurred within the first two minutes. The exception was the interview with User A, where, in the first five minutes, only one out of a total of thirteen open questions appeared.

The reason for the lack of such questions at the beginning of the interview with User A seems to lie in the search analyst's attempt to pin the user down to specific terms very early in the interview, as, having begun the interview with an open question, she received the indication that the user's topic was an unusual one for which there were few applicable descriptors on the system. Continuing to describe his topic in general terms, therefore, would be of little use. In contrast, the lack of open questions on the whole in the interview with User D (there were only four) seems to occur because, from the user's first explanatory statement, the search analyst was able to say "I think that kind of thing wouldn't be too hard to find...actually, because there are some very specific words" and began to ask closed questions in order to obtain a specific listof descriptors.

It may be observed that the EISO search analyst spends the greater part of an interview asking about specific terms, suggesting particular descriptors from the *Thesaurus of ERIC Descriptors*, explaining to the user what they mean, and indicating how she will combine them in the search strategy. Because of this need, then, for a listing of specific headings and specific combinations of major and related descriptors, the search analyst's use of the closed questions dominates the interview after the opening few minutes.

Role and Status Relationships. With regard to the question of role relationships, the situation in which the EISO search analyst finds herself is in many ways different from that of a reference librarian. While the latter may find the interviews unscheduled and openended, the search analyst often makes an appointment with the user beforehand, and many times has at least some prior knowledge of the user's topic. Further, while lack of time and the competing attention of other users may be variables in the library situation, prior appointment and the fact that the EISO office is located in a separate room in the library of The Ontario Institute for Studies in Education, effectively eliminate these difficulties.

Initially, the sex of the user was presumed to be a variable in both status and deference patterns in the interaction. However, bearing in mind the limitations of a tape-recording, this factor was not found to affect these patterns.

While there was no role difference in clients of different sexes, there was a difference that appeared between academic and non-academic clients. The two academic clients, both of whom were by chance master's students in psychology, stated their questions in terms of formal research designs.

In contrast, the questions of the two non-academics were more open-ended. One wished to know about the role school librarians and children's reading habits; the other about computer-assisted instruction for teaching brain-damaged children a mode of symbolic communication.

Developing a Preliminary Model of the Negotiation Process

While recognizing the danger of trying to generalize outward from a small sample of interviews, a number of points nevertheless are suggestive. First, that some of the issues raised in the literature on the traditional reference interview are also helpful in studying online negotiation processes. The aspects that hold most relevance seem to be those associated with empathy and non-verbal behaviour, the structure of the negotiation, and the use of open and closed questions. The one aspect that does not seem to bear much relevance is that related to role and status relationships. Second, these elements seem to be constant at least in some degree regardless of the nature of the topic, the user, or the system used. Such an observation leads one to the notion that it may be possible to represent these stable elements by constructing a model. Such a preliminary attempt to visualize the negotiation process is presented in Figure 1.

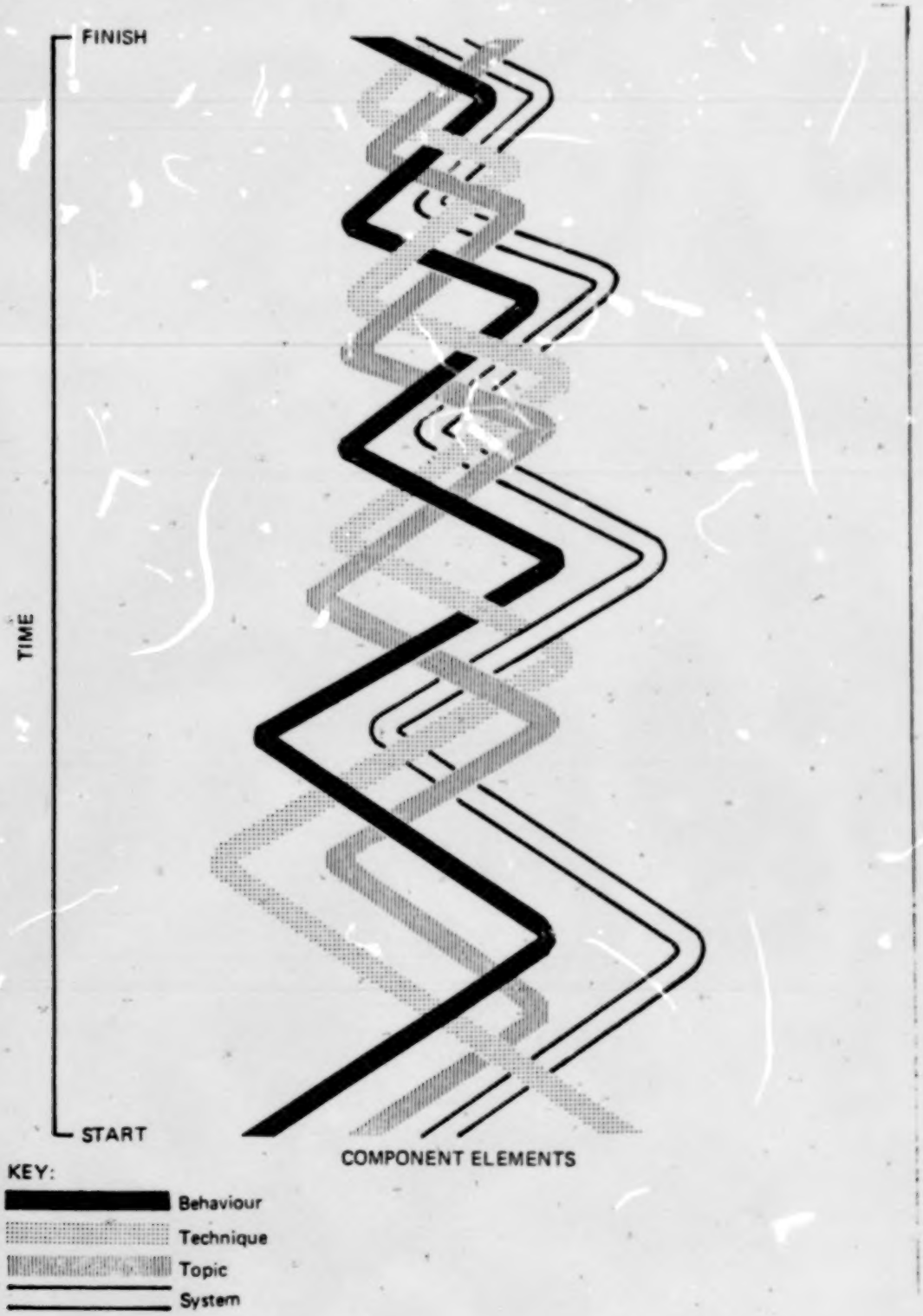
From the analysis of the interviews, it became clear that the negotiation process is not a rigid progression with a clearly defined beginning, middle, and end that inexorably follow upon each other but rather it has a more iterative, repetitive nature as the determination of the specific requirement of the user emerges. It therefore could not be represented by a simple linear design but called for a more dynamic mode of representation. The notions of reiteration and dynamism brought to

mind the model of the spiral curriculum in education and the double helix in molecular biology. The former incorporates the idea of returning to concepts already introduced to define and learn about them in greater detail -- a process the analyst uses as she moves from a general understanding of the user's topic to the more specific choice of descriptors and search strategies -- while the latter draws attention to the multiplicity of interwoven links that are both constant and different in all of nature. Obviously, close parallels cannot be drawn, but the notion of using spiralling strands seemed to combine continuously evolving specificity with dynamic interaction. Unlike the elegant simplicity of the double helix, however, the model of the negotiation process was pictured as having at least four component elements. These are associated with the user, the search analyst, the topic to be searched, and the system to be used for searching. It is not the representation of these holistic elements that is the concern here but the depiction of the elements that surface as being important during the negotiation process. At a micro level these have been identified as empathy and non-verbal behaviour, structure, and open and closed questions. At a more macro level, the importance of a specific characteristic such as empathy can be broadened to stand for behavioural characteristics in general and the specific method of using open and closed questions for a broader range of techniques used by the search analyst. The notion of structure is incorporated by the sequential progression of the interview in stages through time. In addition, there are at least two other strands that weave through the typical negotiation process, the substantive content of the request and the technicalities pertaining to the choice of descriptors, the formulation of search strategies, and the operation of the system and data base chosen. The first of these is represented by the term "topic", the second by "system."

While the model is meant to be suggestive of general phenomena, it could be adapted to more closely represent specific negotiation interviews. For example, strands may be broadened or narrowed, lengthened or shortened to show when and the extent to which individual elements occur. They may be divided and color-coded to emphasize the prime participant in the process at any given time, whether it is the search analyst or the user. Specific environmental influences may be shown to effect the turns

FIGURE 1

THE NEGOTIATION PROCESS



the interview takes. Such detailed mapping, however, must await in-depth analysis derived from a larger sample of negotiation interviews.

Systems Evaluation of User Satisfaction with EISO

A systems approach was used in developing the framework, incorporating the traditional categories of input, process, output, and feedback. In its application, particular emphasis is placed upon assessing the relationships between variables of interest at different stages, such as input and output, while controlling for the effects of intervening variables. It is hoped that in achieving a better understanding of such relationships, those operating search services can make more rational decisions about policies and procedures.

Application of Model

The purpose of the first application of the evaluation model was to determine to what extent the client's personal and professional background is related to his or her satisfaction with EISO. The purpose of the second is to determine the relationship among the procedures followed in processing a search request and the user's gain in knowledge and degree of satisfaction. Together, these assessments should provide a good understanding of the factors affecting user satisfaction with the service, and thereby suggest methods of maintaining and increasing it.

The population for this study is the universe of all 371 searches requested from EISO between May 1, 1976 and April 30, 1977. The total number of subjects was 148 (40% of all searches), but missing responses on some variables result in a smaller number being used for some analyses.

Path analysis was selected to analyze the relationships among input, process, and output variables because it provides a method of testing the validity of casual inferences for pairs of variables while controlling for the effects of other variables.

Sociological Input Model

Who are EISO's users and how does their identity affect their levels of satisfaction with the service? These are important questions which reflect the success of the service in achieving its goals. By

implication, if one kind of client is less satisfied than another, changes in the service might be necessary in order to raise their level of satisfaction.

The question as to the users' identities is answered here in terms of the two sociological concepts, role and status. We view these as characteristics that clients bring with them to their encounter with the search service, and as such represent inputs to the system. Since status is itself in large part an attribute associated with a given role, it is difficult to measure these two aspects separately. Most of the variables we have selected reflect, to one degree or another, both the role and status of the individual client.

Process Model

As with the sociological input model, the process model for explaining levels of user satisfaction represents a sub-system within the larger evaluation framework, and involves only a fraction of the data collected. Key process variables are the method of contact, the system used to search the data base, the length of time required for the search interview and to plan the search strategy the connect-time, the number of citations printed, and price. All of these variables except the method of contact relate directly to the cost of operating the service or the price charged.

Discussion

The process model was moderately successful at explaining user satisfaction. One variable seems to have a consistent effect, namely price. The negative effect of price on satisfaction was apparent with overall satisfaction, and satisfaction with particular components of the service: publicity materials and directions, convenience and helpfulness, and timeliness. It did not affect satisfaction with the technology or materials produced. In interpreting this differential effect of price, it must be noted that 9% of all users received free searches, and most others paid $30 or more. It would appear, then, that when individuals are paying for a bibliographic search, they expect more in the way of service than they would if they were receiving it for free. Yet, it is important to note that their expectations with regard to

service do not carry over to their assessment of the value of the goods, which they apparently assess independently of amount paid.

There is another variable which is related to various satisfaction scores with some consistency, the amount learned about the topic searched. This variable is an output variable in its own right, but interviews between satisfaction and all process variables except price. It is positively related to overall satisfaction, satisfaction with timeliness of service, and most important, satisfaction with the value of the bibliography and materials. This last relationship helps to validate the satisfaction items, since one would expect a person who learns more than another from a bibliography to be more satisfied with it. But more important, it highlights the idea that the client is motivated to learn, and that if this learning does not occur, dissatisfaction will result.

Relationships for the remainder of the process model have been confirmed. Price is affected by the number of citations printed; the number of citations printed is affected by connect-time -- but not interview/strategy time; and both connect-time and interview/strategy time are affected by the method of contact. If there is a surprise here, it is that while the personal contact is responsible for taking a considerable amount of the search analyst's time, the production of longer bibliographies and higher prices, it seems to bear no relationship to either amount learned or the level of satisfaction.

EISO Today: The Result of Research, Development, Dissemination, and Evaluation

When preliminary investigation into the creation of the Educational Information System for Ontario began in the early years of this decade the world of online bibliographic searching was in its infancy. Little documented evidence existed on the optimal methods of setting up a search service, numbers of users that might be expected to use it, or the costs incurred in providing it. The choice of data bases was limited and searching techniques relatively simple. Advances in the field have, however, taken place with sometimes startling rapidity and these changes combined with the findings of our own research have affected the development of EISO and how it is run today. The purposes of this section,

therefore, are to present an overview of recent trends and developments in accessing data bases online and to document the changes that have occurred in the ERIC service.

These various changes have, of course, profoundly affected the type of service that ERIC is able to offer its users. For example, when the service began in March 1975, only one data base (ERIC) was searched and only one system (SDC) used to access that file. Now several systems including SDC, Lockheed, ORBIT II, and The New York Times are used to provide access to a variety of data bases in education and the closely related social sciences.

The service has expanded its provision of original documents by supplying users with a choice of the following formats: microfiche copies of fiche documents, paper copies of journal articles, and paper copies of microfiche documents. The first two of these options are supplied directly by ERIC staff, the last through an arrangement with Microfilm, a local commercial company.

Pricing policies have been substantially changed also. Initially, as a result of data collected during a short trial period, a flat fee of $30 was charged per search. Then, as it became possible to obtain exact computer costs incurred by each search on the printout and as it became clear that there was little link between time spent on a search by the search analyst (within the limits set by ERIC) and the satisfaction of the user, the decision was taken to introduce a sliding price structure. Now the user is charged for direct computer connect-time costs, number of citations printed, and a flat rate for the search analyst's time to the nearest quarter-hour. These costs associated with connect-time and citations vary with the system accessed and data base used. This new pricing structure has the advantage of imposing economic discipline on the search analyst without reducing the quality of the search.

Publicity efforts have also been somewhat modified as a result of research and practice. It was found that articles and advertisements in professional journals went virtually unheeded and did not serve as an effective stimulant for users. Far more effective were the brochures sent to school boards. Direct mailing to all schools in the province was tried but found to be excessively costly for the number of users generated. The current methods of [illegible], the service consist of twice yearly

mailings of 12,000 brochures to school boards, directors of education, professional associations, etc.; flyers distributed at Expos and full ERIC student registrations; inclusion of sessions about ERIC in graduate courses [23]; Research Methods in Educational Administration; [25]; Retrieval of Knowledge in Education, and [26]; Dissemination and Utilization of Knowledge in Education. In addition, high visibility is maintained by attendance at conferences, orientation tours for visiting educators, and the packaging of bibliographies and original documents in covers with the distinctive ERIC logo.

With the start of Phase IV of the ERIC project in April 1978, the main thrust of the Ministry of Education moment became the provision of the online bibliographic retrieval service. Collection of research data was sharply curtailed and all data collection instruments were revised to reflect the shift in emphasis from research project to service monitoring. The Search Request Forms, ERIC Service Evaluation Interviews, and ERIC User Evaluation Questionnaires are designed to provide information on who uses the service, the purpose for which they use it, their degree of satisfaction with it, and the cost of providing it. Items referring to other types of information have been eliminated.

The role of the Education Information Consultant or EIC, the intermediary between geographically remote users and the centrally located information resources, that began in 1972 is continuing though in a modified format. Detailed case studies of the four part-time EICs showed that these individuals were indeed performing a useful function as perceived by their users. Their greatest contributions tended to be in the early stages of the search process in making the potential user aware of the service and helping him to define and clarify his problem or information need. The roles that developed were found to differ significantly in their configurations with the functions performed, time spent, numbers of users varying markedly from EIC to EIC. One of the unexpected outcomes of the linkage program was the springing up of voluntary or self-selected EICs who had heard about the service and felt that it could be useful to their organization. These volunteers have become repeat users of the ERIC service and have generated numerous searches over the past three years.

The roles of ERIC's staff members have also undergone changes.